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(54) **Polymeric composition of matter, oriented polymeric films and shrink bags made therefrom.**

(57) Molecularly oriented films (10) for use in shrink packaging comprise a blend of 10 to 90% by weight of linear low density polyethylene with ethylene vinyl acetate. The blend can form one layer (16) of a triple layer film laminate, the other layers being a barrier layer (14) for instance comprising an ethylene vinyl alcohol copolymer and a third layer (18) which can be ethylene vinyl acetate or a blend similar or identical to that forming the layer (16). As an alternative, a five layer film can utilise the linear low density polyethylene, for one or more of its layers (116, 120, 122, 118), in the form of a blend as aforesaid or alone. Bags made from the multiple layer films are especially useful for the shrink packaging of meats having large cavities and bony protrusions.

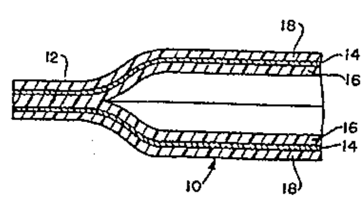

FIG. 2

EP 0 092 897 A2

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"POLYMERIC COMPOSITION OF MATTER, ORIENTED POLYMERIC FILMS AND SHRINK BAGS MADE THEREFROM"

The present invention relates to a polymeric composition of matter, oriented polymeric films and shrink bags made therefrom.

Heat shrinkable polymer films have gained substantial acceptance for such uses as the packaging of meats. This description will for convenience refer to the film packaging of meat, but it is to be understood that films according to the invention are also suitable for packaging other products. Some films embodying this invention will normally be formed as heat shrinkable bags and supplied to the meat packer with one open end. They are to be closed and sealed after insertion of the meat. After the product is inserted, air will normally be evacuated, the open end of the bag closed, for instance by heat sealing or by applying a metal clip, and finally heat is applied, such as by hot water, to initiate shrinkage of the film about the meat.

In subsequent processing of the meat, the bag may be opened and the meat removed for further cutting of the meat into user cuts, for retail sale, for example, or for institutional use.

Successful shrink bags must satisfy a multiplicity of requirements imposed by both the bag producer and the bag user. Of primary importance to the bag user is the capability of the bag physically to survive intact the process of being filled, evacuated, sealed closed, and heat shrunk. The bag must also be strong enough to survive the handling involved in moving the packaged meat, which may weigh 100 pounds (45 kg) or more, along the distribution system to the next processor, or to the user. Thus, the bag must physically protect the meat.

It is also highly desirable to the bag user that the bag serve as a barrier against infusion of gaseous matter from the surrounding environment. Of particular importance is the exclusion of oxygen, since oxygen is well known to affect meat deleteriously.

The bag producer requires a product which can be produced competitively while meeting the performance requirements of the user. Thus the bag material should be readily extrudable, and susceptible to orientation, with sufficient leeway in process parameters as to allow for efficient film production. The process should also be

susceptible of efficient extended production operations. In the orientation process, the film must be tough enough to withstand the necessary stretching. The orientation temperature should be a temperature which can be economically achieved by the producer, and which provides for use of economical shrink processes by the bag user.

Conventional shrink bags have generally been constructed with ethylene vinyl acetate copolymers (EVA). In some cases the bags contain a layer of a Saran (Registered Trade Mark) copolymer to serve as an oxygen barrier. Ethylene vinyl alcohol copolymer (EVOH) has also been suggested as the barrier layer.

Notwithstanding the advantages, shrink-bag packaging of meat is not without its difficulties, many of which are attributable to limitations in the film. As will be appreciated, the processes of stretching the film, and later shrinking it, expose the film to rather severe conditions, due to the nature of the operations.

It is especially important to appreciate that the film is particularly vulnerable to failure due to the relatively high temperatures to which it is exposed in the orientation and

shrinking processes.

The film must be susceptible of orientation without distortion, or separation of the layers which are normally present in films of this nature. The film must be strong enough, at the orientation temperature, to withstand the stretching without the creation of holes or tears, and must not develop non-uniform zones of stretching.

In the case of blown tubular film, the film must be capable of supporting the stretching bubble during the orientation process. Finally, each one of the layers of a multilayer film should be susceptible of orientation without fracture, separation, or creation of holes therein.

In the packaging phase, the film must respond to heat rapidly enough for commercial practicality, and yet must not exhibit such a level of shrinkage as would cause the film to pull apart or delaminate under its own internal shrinkage forces. Shrink-related problems are seriously aggravated when a cut of meat includes protruding bones and/or significant cavities in its surface.

Where there are cavities in the meat, such as around the interior of a rib section, the redistribution of an area of the film adjacent

the cavity places especially severe strains on the ability of the film to conform to the meat in the shrinking process while maintaining film continuity. All too commonly, the film may develop holes in the cavity area, thus breaching the physical and chemical protection which the packaging film should provide for the contained product.

An object of this invention is to provide improved polymeric material and film structures for use in shrink bags well able to withstand production and shrink processes, so that bags made therefrom can withstand the shrink processes intact, especially when a packaged item such as meat, has a large cavity in a surface thereof.

According to one aspect of the invention, there is provided a polymeric composition of matter which comprises a blend characterised by 10% to 90% linear low density polyethylene (LLDPE) and 90% to 10% EVA, the percentages being by weight. The invention comprehends an oriented polymeric film made from this composition, and in a preferred embodiment of the film, the composition comprises 20% to 30% LLDPE.

The invention is preferably embodied in an

oriented multiple layer polymeric film.

The invention accordingly provides an oriented multiple layer polymeric film, comprising a first, barrier layer having second and third layers adhered one to each of the opposite surfaces of the first layer, characterised in that the second layer is 10% to 90% linear low density polyethylene and 90% to 10% ethylene vinyl acetate, and the third layer is selected from ethylene vinyl acetate, and blends of 10% to 90% linear low density polyethylene with 90% to 10% ethylene vinyl acetate, the percentages quoted being by weight.

Multiple layer polymeric films can be made from more than three layers, for instance from five layers. In that case, the LLDPE is an essential component of the structure and is either present in one or more layers formed as a blend containing the LLDPE, or - also according to the invention - as a separate layer or layers composed entirely of LLDPE.

According to another aspect of the invention, therefore, there is provided an oriented multiple layer polymeric film comprising a first, barrier layer having second and third layers each adhered

to a respective one of the opposite surfaces of the first layer with fourth and fifth layers adhered to the second and third layers on the respective surfaces of the latter layers opposite the first layer, characterised in that the second and third layers have essentially the same composition and comprise a first pair of layers; the fourth and fifth layers have essentially the same composition and comprise a second pair of layers, and further characterised in that in the combined composition of the first and second pairs of layers, at least one of the pairs comprises at least 50% by weight of an ethylene vinyl acetate component, the remainder of that pair being a linear low density polyethylene; and at least one of the said pairs comprises at least 10% by weight of a linear low density polyethylene component, the remainder of that pair being ethylene vinyl acetate, the requirement for the presence of at least 50% of the ethylene vinyl acetate component and for at least 10% of the linear low density polyethylene component being met either by one of the said pairs having both the components or by each of the said pairs having a respective one of the components.

In preferred five-layer structures of this sort, the first pair of layers comprises 70% to 100% EVA and the second pair of layers comprises 10% to 90% LLDPE, but in other embodiments, the first pair of layers is 100% EVA and the second pair of layers is 50% to 90% LLDPE.

In an alternative arrangement the first pair of layers comprises 50% to 100% LLDPE and the second pair of layers comprises 50% to 100% EVA. In an especially preferred arrangement, the first pair of layers comprises 90% to 100% LLDPE and the second pair of layers comprises 90% to 100% EVA.

The invention further provides an oriented multiple layer polymeric film, comprising a first, barrier layer having second and third layers each adhered to a respective one of the opposite surfaces of the first layer, characterised in that the second and third layers both have essentially the same composition, a fourth layer is adhered to one of the second and third layers and a fifth layer is adhered to the fourth layer, and further characterised in that the second, third and fifth layers comprise ethylene vinyl acetate, while the fourth layer comprises 10% to 100% by

weight linear low density polyethylene.

In a preferred embodiment of this form of the invention, the fourth layer is 100% LLDPE.

In all the multiple layer films of the invention, the barrier layer is preferably either polyvinyl chloride-polyvinylidene chloride copolymer (Saran) or EVOH, or a polymeric blend containing EVOH.

In preferred films according to the invention, the overall composition of the film is 20% to 30% LLDPE.

The invention comprehends heat sealable shrink bags for utilization particularly in packaging of meat, which may have bony projections or large cavities, wherein the bags are made from oriented films according to the invention.

Preferred embodiments of the invention will now be described by way of non-limiting example in the following description, with reference to the accompanying drawings, in which:

FIGURE 1 is a plan view of a bag made according to the invention,

FIGURE 2 is a cross-section of the bag of FIGURE 1 taken on the line 2-2 of FIGURE 1,

FIGURE 3 is a cross-section similar to

FIGURE 2, but showing a 5-layer bag structure instead of a 3-layer structure.

FIGURE 1 shows a bag 10 according to the invention. The empty bag shown is a collapsed, molecularly-oriented tube having a closing heat seal 12 across one end of the tube. The other end of the bag is left open for insertion of meat, and it is normally closed and sealed after the meat is put into the bag.

The cross-section of the bag in FIGURE 2 shows a typical structure where the bag is made from a three-layer coextruded plastics film. Layer 14 is a barrier layer which minimizes the transmission of oxygen through the film. Preferred barrier layer materials are Saran, EVOH, and blends of EVOH. Layer 16 is the heat seal layer. Layer 18 is the outer bag layer and serves a primary function of protecting the package and its product from physical abuse. In a three-layer film as in FIGURE 2, embodying the invention, layer 18 is a blend of 10 weight percent to 100 weight percent of an EVA and 90 weight percent to 0 weight percent LLDPE. Layer 16 is 10% to 100% of an EVA and 0% to 90% LLDPE. Independent of the individual compositions of layers 16 and 18,

either of which may be 100% EVA, one of the layers 16 and 18 must contain at least 10% LLDPE.

In engineering the specifications for a specific film according to the invention, one deals with the following independent variables: barrier layer composition and thickness, the specific EVA, the specific LLDPE, the ratio of EVA/LLDPE in the sealant layer 16 and the exterior layer 18 and the thicknesses of layers 16 and 18, and the overall thickness of the film.

The overall thickness of films of this invention is nominally the same as the thickness of conventional films. Films are generally about 2.0 mils (0.05 mm) thick with a normal range of 1.5 to 3.0 mils (0.038 to 0.076 mm). Films thinner than 1.5 mil (0.038 mm) tend to be too weak to perform all required functions. Films thicker than 3.0 mils (0.076 mm) are unable to compete economically with thinner films.

LLDPE polymers suitable for use in this invention are those having a melt index (MI) of up to about 6. Preferred LLDPE polymers have an MI of 0.5 to 1.5. Among the preferred polymers are 2045 from Dow Chemical Company and 11P from DuPont Company.

As used herein, the term melt index refers to the physical property determination described in ASTM-D1238.

Preferred EVA's are those having 6% to 12% vinyl acetate (VA) content and a melt index less than 1. While blend amounts are quoted herein in terms of weight percent, VA contents are in mole percent. Especially preferred EVA's have VA contents of 7% to 9% and melt indices of 0.2 to 0.8.

The amount of LLDPE in the blend is selected to provide the best balance of properties which maximizes the desirable benefits of each of the elements of the blend. The EVA provides high levels of adhesion to the barrier layer when the barrier layer is Saran or certain EVOH blends such as disclosed in our US patent application serial No. 290,172 herein incorporated by reference. EVA's having greater than about 85% ethylene also provide substantial structural strength to the film during the orientation process, and are especially beneficial for the orientation of tubular films. The LLDPE is highly desired for its capability of surviving intact the processes involved in shrinking and, in general, the striking ability of shrink bags to withstand the shrinking process

correlates directly with increasing LLDPE contents. In designing the bag, the desire to increase the LLDPE percentage to improve shrink performance is tempered, however, by the other demands on layers 16 and 18 which are better met by the EVA. Initial improvements in the film, compared to films having straight EVA in layers 16 and 18, are seen in films having as little as 10% LLDPE in layers 16 and 18. Films having 20% to 30% LLDPE show marked improvements. Films having higher percentages of LLDPE, such as 50% to 90% have even better shrink performance, but are increasingly more difficult to stabilize in the manufacturing process. Films having 100% LLDPE in either layer 16 or 18 are physically possible but not preferred because of difficulties in manufacturing them.

The thickness of each layer of the present films is essentially the same as the corresponding layer in conventional shrink films. By way of example in a typical film used to make the bag of FIGURES 1 and 2, the overall film thickness is 2.25 mils (0.057 mm). Layers 14 and 18 are 0.4 mil (0.01 mm) and layer 16 is 1.45 mils (0.037 mm).

The barrier layer is preferably either Saran or EVOH (or a blend of polymers containing EVOH). Saran is a well known and well accepted barrier material. The use of LLDPE in the outer layers of three layer structures, where Saran is the barrier layer, provides to the user the benefit of up-grading a known packaging material. However, the benefits of using an EVOH or EVOH blend as the barrier material have been thoroughly researched and described. Combining an EVOH blend as the barrier layer 14 with LLDPE-EVA blends in layer 16 and 18 provides a superior film. The EVA and EVOH blends contribute to facilitating manufacturing processability. The LLDPE contributes to strikingly improved shrink performance. The EVOH blend may, in addition, provide superior oxygen barrier.

The films described herein are susceptible to being manufactured according to conventional orientation processes. In the following examples, a few films are described in detail as being manufactured using equipment common to the "double bubble" process. Other films of the invention, iterated in a later tabulation, may be made by this or other conventional processes. Choice of

the desired process depends not only on the film composition and structure but also on specific properties desired; and thus these choices on any given film are a matter of engineering selection.

EXAMPLES 1-4

Example 1A is a control film having a core layer of Saran and outer layers of an EVA identified as 3638, and having a melt-index of 0.4 and a VA content of 7.5%. The Saran and EVA were plasticated and melt extruded through three separate extruders into a three-layer die and formed into a three layer tubular film on conventional "double bubble" equipment. The resulting film was biaxially oriented, with a stretch factor of approximately 3/1 in the with-machine direction with respect to the cross-machine direction. The oriented film was 2.25 mils thick (0.057 mm); and was composed of: 1.45 mils (0.037 mm) sealant layer of 3638 EVA, 0.4 mil (0.01 mm) Saran barrier layer, and a 0.4 mil (0.01 mm) outer layer of 3638 EVA. EXAMPLE 1B was the same as EXAMPLE 1A except that 80232 EVA was used in place of 3638 EVA.

Example 2 was the same as Example 1A

except that a blend of EVA and LLDPE was substituted for the sealant layer. The outer and barrier layers were unchanged. For the sealant layer, 30 parts by weight of pellets of Dowlex 2045 LLDPE were dry blended with 70 parts by weight of pellets of 1060 EVA. The blended composition, the 3638 EVA and Saran, were extruded through three extruders and oriented as in EXAMPLE 1. The sealant layer, barrier layer, and outer layer of the resulting film had the same thicknesses as quoted above for EXAMPLE 1.

In EXAMPLE 3, a film was made having the same layer structure and dimensions as in EXAMPLES 1 and 2, with only the layer compositions being changed. The composition of the sealant layer and the outer layer were formed by dry blending as in EXAMPLE 2, pellets of the respective polymers used. Both the sealant and outer layers were 30% by weight Dowlex 2045 LLDPE and 70% UE-657 EVA.

For EXAMPLE 4, a film having the same layer structure and dimensions was made as in EXAMPLE 3, with the outer and sealant layers being a blend of 30% 2045 LLDPE and 70% 80232 EVA.

TABLE 1 shows significant properties of the polymers recited above as well as the polymers mentioned in subsequent examples and structures.

TABLE 1

Polymer Properties

Cited Polymer	Type of Polymer	Melt Index	% VA Content
LD 310.09	EVA	2.3	9.0
NA 235	EVA	0.35	4.5
NPE 490	EVA	0.5	8.0
Plexar (1)	EVA, modified	1.0	4.0
UE 643	EVA	9.0	20
UE 655	EVA	2.0	9.0
UE 657	EVA	0.5	12
360	EVA	2.0	25
1060	EVA	0.5	7.5
3120	EVA	1.2	7.5
3121	EVA	0.5	7.5
3134	EVA	8.0	12
3135X	EVA	0.35	12
3165	EVA	0.7	18
3638	EVA	0.4	7.5
80232	EVA	0.38	9.5
11P	LLDPE	0.7	--
2035	LLDPE	6.0	--
2045	LLDPE	1	--

The films of EXAMPLES 1-4 were made into bags by cutting the tubular film into lengths and sealing one end by conventional heat sealing techniques. The resulting bags were subjected to shrink tests using a specially designed test block insert. The test block insert consisted of a rectangular wooden block of a size which approximated to the volume of meat normally placed in bags of the same size as the bags under test. The test block included on its surface a plurality of holes of uniform cross-section, the holes being nominally 3 inches across and 1/1-2 inches deep - the holes simulating the cavities encountered in some cuts of meat.

After the block was inserted into a given bag, the bag was evacuated and sealed closed. The sealed bag was then passed through a conventional hot water shrink process with water temperature controlled at 204°F. to 206°F (95 to 96°C). After the shrink process bags were evaluated for bag integrity, looking particularly for holes in or near the cavities. Bags having no holes were judged as passing the test. Bags having one or more holes were judged as failing the test. TABLE 2 shows the results of the tests for EXAMPLES 1-4.

TABLE 2

Shrink Test Results

Example No.	No. of Bags Tested	Passed	Failed	Percent Passing
1A (control)	10	0	10	0%
1B (control)	5	0	5	0%
2	5	3	2	60%
3	5	4	1	80%
4	10	10	0	100%

While TABLE 2 shows a range of degrees of improvement over the control films, all the films that contained LLDPE did show significantly improved performance as compared to the control film. Even EXAMPLE 2, which had LLDPE only in the sealant layer showed a 60% pass rate compared to 0% for the control.

Additional three layer structures illustrative of the invention are:

/inner layer/barrier layer/outer layer/

/10% 2045-90% 3135x/Saran/10% 2045-90% 3135/

/30% 2045-70% UE657/Saran/30% 2045-70% UE657/

/40% 2045-60% UE657/Saran/40% 2045-60% UE657/

/50% 2045-50% UE657/Saran/50% 2045-50% UE657/

/60% 2045-40% UE657/Saran/60% 2045-40% UE657/

/70% 2045-30% UE657/Saran/70% 2045-30% UE657/

/40% 2035-60% UE657/Saran/40% 2035-60% UE657/

/40% 11P-60% UE657/Saran/40% 11P-60% UE657/

/40% 2045-60% UE657/Saran/100% 3638/

/40% 2045-60% UE657/Saran/100% 3121/

/40% 2045-60% UE657/Saran/100% UE657/

/30% 2045-70% 1060/Saran/30% 2045-70% 1060/

/20% 2045-80% 3121/Saran/20% 2045-80% 3121/

/20% 2045-80% 3124/Saran/20% 2045-80% 3124/

/30% 2045-70% 310.09/Saran/30% 2045-70% 310.09/

/40% 2045-60% 3134/Saran/40% 2045-60% 3134/

/60% 2045-40% 3165/Saran/60% 2045-40% 3165/

/60% 2045-40% UE643/Saran/60% 2045-40% UE643/

/70% 2045-30% 360/Saran/70% 2045-30% 360/

Thus it is seen that LLDPE may be blended with a large family of EVA polymers. The resulting films are susceptible of stretching by conventional processes, and the films are capable of surviving the stretching process intact.

A more complex form of the invention is an oriented 5-layer polymeric structure as shown in FIGURE 3. In this structure, layer 114 typically represents the barrier layer. Layer 118 serves as the exterior, abuse-resistant layer. Layer 120 is the sealant layer. Layers 116 and

122 serve as transition layers, or compatibilizing layers between the layer 114 and the layers 118 and 120. Layers 116 and 122 may also provide, as can any of the layers, certain desirable structural and strength benefiting properties.

In typical structures, like polymeric compositions in layers 116 and 122 and also in layers 118 and 120 provide a chemical balance of properties centered physically about barrier layer 114. Thus layers 116 and 122, in their normal functions, may serve as chemical as well as physical bridges to layer 114. Since they are not subjected to the physical and chemical abuses imposed on the sealant layer 120, and the outer layer 118, the composition and thickness of layers 116 and 122 may, in many cases, be selected for their desirable properties somewhat independently of those properties required of the external layers by external abuses imposed directly on them. Thus layers 116 and 122 may be selected with substantial freedom to reinforce the film in functionally weaker areas.

In one structure, layer 114 is Saran, layers 116 and 122 are EVA and layers 118 and 120 are either LLDPE or a blend of LLDPE with EVA.

In another structure, layer 114 is Saran, layers 116 and 122 are LLDPE and layers 118 and 120 are EVA. Likewise, one or both pairs of layers, wherein 116 and 122 are a first pair and 118 and 120 are a second pair, may be blends of LLDPE and EVA.

In an unbalanced structure also illustrated by FIGURE 3, layer 116 is the barrier layer (e.g. of Saran), layers 114 and 120 are EVA, layer 122 is LLDPE and layer 118 is EVA. Other 5-layer structures incorporate EVOH as the barrier layer. In light of the entire foregoing description of the invention, the following are thus illustrative of 5-layer structures of the invention, the first mentioned layer being layer 120.

/EVA/Saran/EVA/LLDPE/EVA/
/EVA-LLDPE blend/Saran/EVA-LLDPE blend/LLDPE/EVA/
/EVA/Saran/EVA/EVA-LLDPE blend/EVA/
/EVA/LLDPE/Saran/LLDPE/EVA/
/EVA/LLDPE-EVA blend/Saran/LLDPE-EVA blend/EVA/
/LLDPE-EVA blend/EVA/Saran/EVA/LLDPE-EVA blend/
/LLDPE-EVA blend/EVA/Saran/EVA/LLDPE/
/EVA/Plexar/EVOH-LLDPE blend/Plexar/EVA/
/EVA/LLDPE-Plexar blend/EVOH/LLDPE-Plexar blend/EVA/
/EVA-LLDPE blend/Plexar/EVOH/Plexar/EVA-LLDPE blend/

/EVA/EVOH/Plexar/LLDPE/EVA/

/Plexar/EVOH/Plexar/LLDPE-EVA blend/EVA/

/Plexar/EVOH-LLDPE blend/Plexar/LLDPE/EVA/

/Plexar/EVOH-LLDPE blend/Plexar/EVA/EVA/

Other permutations of the above oriented 5-layer structures will now be apparent to those skilled in the art. Common to all of them is the presence of LLDPE, either as a separate layer consisting wholly of LLDPE or as a component of a blend layer.

Claims:

1. A polymeric composition of matter comprising a blend characterised by 10% to 90% linear low density polyethylene and 90% to 10% ethylene vinyl acetate, the percentages being by weight.

2. An oriented polymeric film characterised by comprising a blend according to claim 1.

3. An oriented film according to claim 2, wherein the blend composition comprises 20% to 30% by weight of linear low density polyethylene.

4. An oriented multiple layer polymeric film, comprising a first, barrier layer having second and third layers adhered one to each of the opposite surfaces of the first layer, characterised in that the second layer is 10% to 90% linear low density polyethylene and 90% to 10% ethylene vinyl acetate, and the third layer is selected from ethylene vinyl acetate, and blends of 10% to 90% linear low density polyethylene with 90% to 10% ethylene vinyl acetate, the percentages quoted being by weight.

5. An oriented film according to claim 4, characterised in that the second and third

layers are 20% to 40% by weight linear low density polyethylene and 60% to 80% by weight ethylene vinyl acetate, the ethylene vinyl acetate having a vinyl acetate content of 6 to 12 mole percent and a melt index of 0.3 to 0.9, and the linear low density polyethylene having a melt index of 0.5 to 1.5.

6. An oriented multiple layer polymeric film, comprising a first, barrier layer having second and third layers each adhered to a respective one of the opposite surfaces of the first layer, characterised in that the second and third layers both have essentially the same composition, a fourth layer is adhered to one of the second and third layers and a fifth layer is adhered to the fourth layer, and further characterised in that the second, third and fifth layers comprise ethylene vinyl acetate, while the fourth layer comprises 10% to 100% by weight linear low density polyethylene.

7. An oriented multiple layer polymeric film comprising a first, barrier layer having second and third layers each adhered to a respective one of the opposite surfaces of the first layer, with fourth and fifth layers adhered to the

second and third layers on the respective surfaces of the latter layers opposite the first layer, characterised in that the second and third layers have essentially the same composition and comprise a first pair of layers; the fourth and fifth layers have essentially the same composition and comprise a second pair of layers, and further characterised in that in the combined composition of the first and second pairs of layers, at least one of the pairs comprises at least 50% by weight of an ethylene vinyl acetate component, the remainder of that pair being a linear low density polyethylene; and at least one of the said pairs comprises at least 10% by weight of a linear low density polyethylene component, the remainder of that pair being ethylene vinyl acetate, the requirement for the presence of at least 50% of the ethylene vinyl acetate component and for at least 10% of the linear low density polyethylene component being met either by one of the said pairs having both the components or by each of the said pairs having a respective one of the components.

8. An oriented film according to claim 7, characterised in that the said first pair of

layers comprises 70% to 100% by weight of ethylene vinyl acetate and the second pair of layers comprises 10% to 90% by weight of linear low density polyethylene.

9. An oriented film according to claim 8, characterised in that the first pair of layers comprises 100% ethylene vinyl acetate and the second pair of layers comprises at least 50% linear low density polyethylene by weight.

10. An oriented film according to claim 7, characterised in that the first pair of layers comprises 50% to 100% by weight of linear low density polyethylene and the second pair of layers comprises 50% to 100% by weight of ethylene vinyl acetate.

11. An oriented film according to claim 10, characterised in that the first pair of layers comprises at least 90% by weight of linear low density polyethylene and the second pair of layers comprises at least 90% by weight of ethylene vinyl acetate.

12. An oriented film according to claim 6, characterised in that the fourth layer is 100% linear low density polyethylene.

13. An oriented film according to any

of claims 4 to 12, characterised in that the said barrier layer is selected from polyvinyl chloride-polyvinylidene chloride copolymer, ethylene vinyl alcohol copolymer and polymeric blends containing ethylene vinyl alcohol copolymer.

14. An oriented film according to any of claims 4 to 13, characterised in that the overall composition of the film comprises 20% to 30% linear low density polyethylene.

15. A shrink bag made from an oriented film according to any of claims 2 to 14.

16. A shrink bag according to claim 15 which comprises an extruded tubular article having one end closed by a heat seal and the other end open for filling the bag, said other end being closeable after filling by heat sealing.

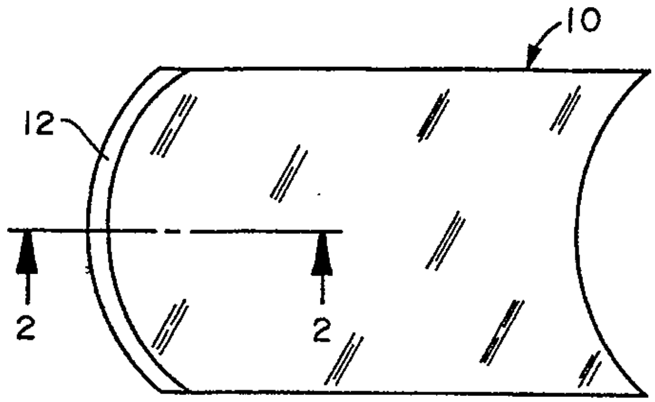

FIG. 1

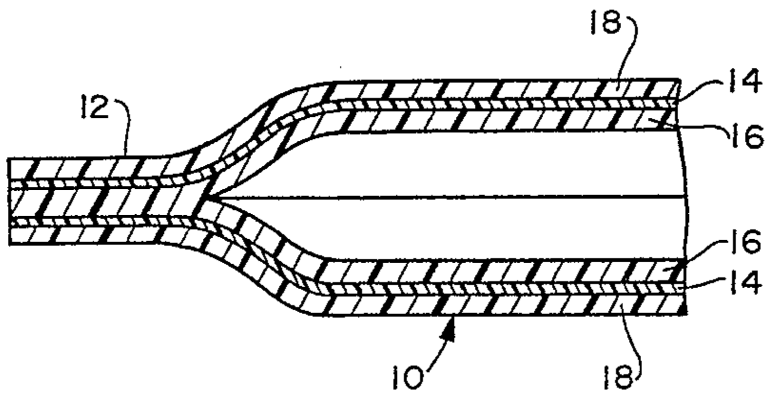

FIG. 2

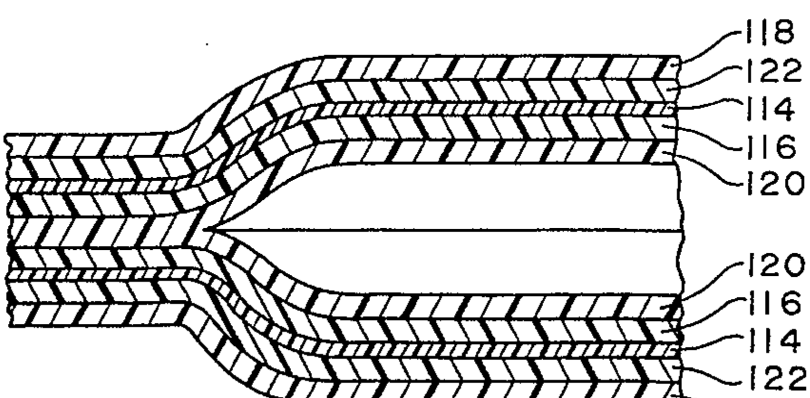

FIG. 3